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# CONTROL OF WATER LILIES WITH ENDOTHAL-FENOPROP, 2,4-D FENOPROP AND 2,4-D+FENOPROP MIXTURES

by

I. Wile

BIOLOGY BRANCH

April 1970

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# CONTROL OF WATER LILIES WITH ENDOTHAL-FENOPROP, 2,4-D FENOPROP AND 2,4-D+FENOPROP MIXTURES

Water lilies are floating-leaved hydrophytes commonly found growing in water depths of approximately 0.5 to 12 feet. When in flower during the summer months, these ornamental plants greatly enhance the aesthetic value of numerous ponds and lakes. However, where dense canopies of the leaves develop, they severely curtail light penetration and entry of oxygen through the surface, hindering the culture of fish and reducing the recreational amenities of the water.

When these undesirable infestations occur, control can be achieved by mechanical means such as dragging or by chemical methods. To compare the efficacy of several well-established herbicides, small plots of water lilies were sprayed at varied application rates during the summers of 1968 and 1969.

## Methods and materials

A total of 20 plots located in Gibson Lake, Albion Township, were sprayed with 2,4-D iso-octyl ester, 2,4-D butoxy-ethanol ester, fenoprop, endothal-fenoprop and a tank mix of 2,4-D and fenoprop. The plots were all 50'x 20' in size and average water depths varied between 1-1/2 and 2 feet.

Since only liquid formulations were tested, the herbicides were mixed with water and were applied from a row boat by means of a back-pack sprayer.

The number of plots treated with each herbicide and the corresponding rates of application are summarized in the following table.

Table 1.

| Herbicide used | Rate of application | No.of plots treated | |
|---|---|---|---|
| | | 1968 | 1969 |
| 2,4-D iso-octyl ester | 2.5 lbs.acid/acre | 2 | - |
| 2,4-D iso-octyl ester | 5 lbs.acid/acre | 2 | 4 |
| 2,4-D butoxy-ethanol ester | 5 lbs.acid/acre | - | 2 |
| fenoprop | 5 lbs.acid/acre | - | 2 |
| 2,4-D +<br>fenoprop | 2 lbs.acid/acre<br>1 lb. acid/acre | - | 2 |
| 2,4-D +<br>fenoprop | 4 lbs.acid/acre<br>2 lbs.acid/acre | - | 2 |
| endothal-fenoprop | 3 ppm (active) | 2 | - |
| endothal-fenoprop | 5 ppm (active) | 2 | - |

* Five of the plots treated in 1969 were re-sprayed six to eight weeks after the initial treatment at identical rates of application.

## Results and discussion

Gibson Lake is a rather shallow body of water which supports large populations of emergent, submerged and floating-leaved plants. One of the most common plants is the yellow water lily, Nuphar variegatum, growing in a wide band around the shoreline and in scattered beds throughout the lake. Small patches of white water lilies, Nymphaea odorata, are scattered throughout the beds of N. variegatum. At the time of the treatments in 1968 and 1969, both types of lilies were in bloom.

Although total eradication did not result in any of the treated plots, growth of the water lilies was reduced in varying degrees, as outlined in the appended tables.

In 1968, endothal-fenoprop applied to four plots at rates of 3 and 5 ppm active provided some initial reduction of N. variegatum. However, partial recovery and new growth were evident by early September, 1968. N. odorata was virtually unaffected at both treatment rates.

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A total of ten plots were sprayed in 1968 and 1969 with the iso-octyl and butoxy-ethanol esters of 2,4-D at rates of 2.5 and 5 lbs. acid equivalent per acre. In 1969, two of the plots were re-sprayed in late July at the same application rate of 5 lbs. acid per acre. Although growth of *N. variegatum* was greatly reduced in all cases, virtually total elimination resulted in the twice-sprayed plots. *N. odorata* was initially affected in two plots treated in 1968 but had largely recovered by early September, particularly in the plot treated at the lower rate. Little difference was noted in the efficacy of the iso-octyl and the butoxy-ethanol ester formulations of 2,4-D.

The results achieved in two plots treated with fenoprop at a rate of 5 lbs. acid equivalent per acre were comparable to the 2,4-D results. Similarly, growth of *N. variegatum* was substantially reduced in the twice-treated plot.

Partial eradication of *N. variegatum* was observed in all four plots treated in 1969 with 2:1 and 4:2 lb. acid equivalent mixtures of 2,4-D + fenoprop. At the time of the final inspection, little further reduction of growth had occurred in two of the plots re-sprayed in early August at the same initial application rates. No significant difference was noted between the 2:1 and 4:2 lb. acid equivalent per acre.

## Summary

1. Substantial reductions of *N. variegatum* occurred in all plots treated with 2,4-D and fenoprop at 5 lbs. acid equivalent per acre. Virtually total elimination resulted in the twice-treated plots.

2. Unsatisfactory control of *N. variegatum* was achieved with endothal-fenoprop and 2,4-D + fenoprop mixtures.

3. *N. odorata* was virtually unaffected by endothal-fenoprop and 2,4-D.

## Acknowledgements

Appreciation is extended to Amchem Products Limited, Chipman Chemicals Limited and Pennsalt Chemicals of Canada Ltd., for supplying the herbicides utilized in this study.

Table 2. Summary of results - 1968.

| Plot No. | Chemical | Rate | Date of treatment | Species present | estimated % coverage prior to treatment | estimated % coverage early September |
|---|---|---|---|---|---|---|
| 1 | 2,4-D iso-octyl-ester | 2.5 lbs. acid/acre | 3/7/68 | N.variegatum<br>N. odorata | 60% | 15% |
| 2 | " " | 2.5 lbs. acid/acre | 3/7/68 | N. variegatum | 90% | 20% |
| 3 | " " | 5 lbs.acid/acre | 3/7/68 | N.variegatum<br>N.odorata | 50% * | 20% |
| 4 | " " | 5 lbs.acid/acre | 3/7/68 | N.variegatum | 90% | 20% |
| 5 | Endothal-fenoprop | 3 ppm (active) | 3/7/68 | N.variegatum<br>N.odorata | 60% * | 45% |
| 6 | " " | 3 ppm (active) | 3/7/68 | N.variegatum | 95% | 50% |
| 7 | " " | 5 ppm (active) | 3/7/68 | N.variegatum<br>N.odorata | 50% * | 45% |
| 8 | " " | 5 ppm (active) | 3/7/68 | N.variegatum | 80% | 30% |

* N. odorata abundant in plot

Table 3. Summary of results - 1969

| Plot No. | Chemical | Rate | Date treated | Date re-treated | Species present | Estimated % coverage prior to treatment | estimated % coverage end of August |
|---|---|---|---|---|---|---|---|
| 1 | 2,4-D iso-octyl ester | 5 lbs.acid/ acre | 13/6/69 | 23/7/69 | N.variegatum | 80% | 10% |
| 2 | " " | " " | 13/6/69 | 23/7/69 | N.variegatum | 80% | 10% |
| 3 | " " | " " | 13/6/69 | - | N.variegatum | 80% | 30% |
| 4 | " " | " " | 13/6/69 | - | N.variegatum | 80% | 30% |
| 5 | fenoprop | 5 lbs.acid/ acre | 25/6/69 | 8/8/69 | N.variegatum | 80% | 15% |
| 6 | fenoprop | 5 lbs.acid/ acre | 25/6/69 | - | N.variegatum | 80% | 35% |
| 7 | 2,4-D butoxy-ethanol ester | 5 lbs.acid/ acre | 25/6/69 | - | N.variegatum | 80% | 35% |
| 8 | " " | " " | 25/6/69 | - | N.variegatum | 80% | 35% |
| 9 | 2,4-D + feno-prop 2:1 | 2 lbs.acid/a.<br>1 lb.acid/a. | 25/6/69 | - | N.variegatum | 65% | 35% |
| 10 | " " | " " | 25/6/69 | 8/8/69 | N.variegatum | 65% | 35% * |
| 11 | 2,4-D + fenoprop 4:2 | 4 lbs.acid/a.<br>2 lbs.acid/a. | 25/6/69 | 8/8/69 | N.variegatum | 65% | 30%* |
| 12 | " " | " " | 25/6/69 | - | N.variegatum | 65% | 35% |
| Control | - | - | - | -- | N.variegatum | 80% | 90% |

* decomposition of plants still in progress

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